eRTCV

Control valves for electronic return temperature control

Modbus

GENERAL DESCRIPTION

Multifunctional ball valve for electronic return temperature control.

It improves efficiency in HVAC systems by automatically balancing the system independently of pressure.

MAIN FEATURES AND FUNCTIONS

- **Pressure-independent flow rate control**
- **Shut-off function**
- **Contact temperature sensors**
- **Integrated control panel**
- **Datalogger function**
- **Analogue signal for remote set-point setting**
- **ModBus-RTU remote management**

APPLICATIONS AND BENEFITS

HVAC and industrial Heating and/or cooling systems.

The use of the **eRTCV** control valve allows the return temperature to be kept constant, at a set value, by acting on the carrier flow rate.

The PICV-type ball valve is capable of maintaining a constant flow rate during the variation of differential pressure conditions of the circuit, thereby freeing the return temperature control from port fluctuations.

The return temperature control has a positive impact on the efficiency of heating and cooling energy generators, and reducing flow rates has a significant impact on pumps and the system.

VERSIONS AND CODES

	Model	DN	Connection	Q max [m³/h]	Δp max [bar]	Start up max [kPa]	PN
	ERTCV2 x(1) 15A x(2)	15	Rp1/2"F	0,36	6	20	25
	ERTCV2 x(1) 15B x(2)	15	Rp1/2"F	0,70	6	20	25
	ERTCV2 x(1) 15B x(2)	15	Rp1/2"F	1,00	6	20	25
	ERTCV2 x(1) 20A x(2)	20	Rp3/4"F	0,78	6	25	25
	ERTCV2 x(1) 20B x(2)	20	Rp3/4"F	1,15	6	25	25
	ERTCV2 x(1) 25A x(2)	25	Rp1"F	2,20	6	30	25
	ERTCV2 x(1) 25B x(2)	25	Rp1"F	2,70	6	30	25
	ERTCV2 x(1) 25C x(2)	25	Rp1"1/4F	3,00	6	30	25
	ERTCV2 x(1) 25D x(2)	25	Rp1"1/4F	4,00	6	30	25
	ERTCV2 x(1) 40A x(2)	40	Rc1"1/2F	6,00	6	30	16
	ERTCV2 x(1) 40B x(2)	40	Rc1"1/2F	9,00	6	35	16
	ERTCV2 x(1) 50A x(2)	40	Rc2"F	12,00	6	35	16
	ERTCV2 x(1) 50B x(2)	40	Rc2"F	18,00	6	35	16

Example code ERTCV2**2**115A**A**

(1) power supply selection: **2** = 230V 50/60 Hz • **4** = 24V 50/60 Hz.

(2) adjuster calibration selection: **A** = Radiator system • **B** = Radiant panel system • **C** = Fancoil system.

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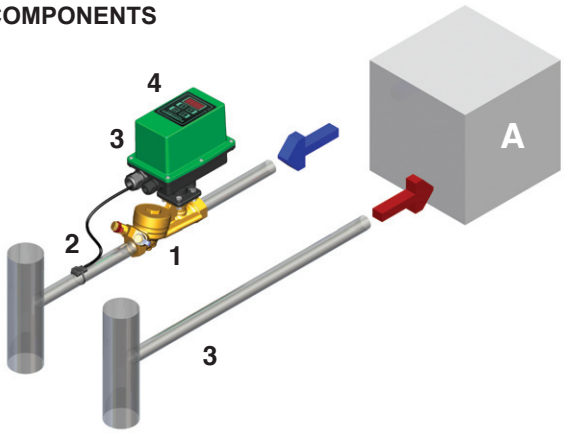
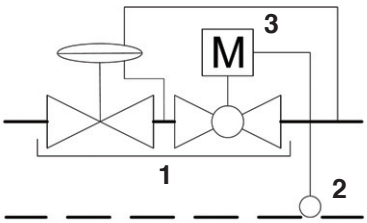
COMPONENTS



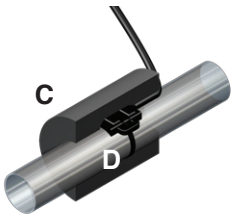
1 : Pressure-independent regulating and balancing valve (PICV)
2 : Contact temperature sensor
3 : Actuator with built-in electronics
4 : Keyboard and display

A : Utility

HYDRAULIC DIAGRAM



DETAIL OF CONTACT TEMPERATURE SENSOR



C : Insulation
D : Fastening band

NOTE:
The sensor must be appropriately isolated

TECHNICAL FEATURES

Functional data	
Fluid	Water, max. glycol 30%
Fluid temperature	-10°C….120°C
Maximum operating pressure	DN15 to DN25: 25 bar DN40 to DN50: 16 bar

Actuator	
Power supply	230 V • 24 V AC ± 15%
Supply frequency	50/60 Hz
Maximum power consumption	15 VA
Operating time (90°)	35 s
Degree of protection	IP65
Electronic adjuster	PID
Temperature control dead band	0,7 °C
Pre-calibration of regulator	Radiator / radiant panel / fancoil systems
Control interface	On-board display and keyboard
Watch buffer battery	Lithium CR2032, service life 10 years
Digital inputs	To be connected to clean contacts (free voltage) - Working voltage 0/5V dc
Activation signal relay outputs	Clean contact (free voltage) - External power supply max. 230V Current max. 1A
Analogue set-point temperature input	0-10 V DC
Analogue input impedance	20 kΩ
Auxiliary limit switches opening and closing	Clean contact (free voltage) - Max. current 1A
Serial interface	RS485
Power and control cable length	80 cm

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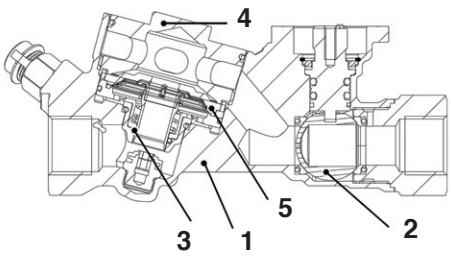
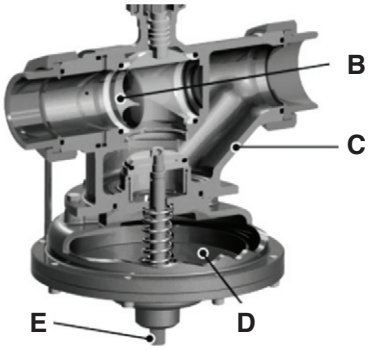
Control valve	
Type	Pressure-independent - PICV
Characteristic curve	Equal percentage
Operating angle	90°
Accuracy	± 5%
Loss class (EN60534-4)	IV (< 0,01% Kvs)

DN15 • DN20 • DN25



1 • Body: BRASS DRZ CW602N
2 • Ball: BRASS CW617N
3 • Cartridge spring: High-strength polymer - EPDM - AISI 303
4 • Cartridge body: BRASS CW614N
5 • Membrane: EPDM

DN40 • DN50



B • Ball: BRASS CW617N - P.T.F.E. Seals
C • Body: CAST IRON
D • Cartridge: BRASS CW614N - EPDM
STAINLESS STEEL - AISI 303
E • Additional manual locking device: BRASS CW614N
- • SEAL EPDM

Temperature sensor	
Sensing element	NTC R(25°C) 10kΩ
Accuracy class (IEC 751)	B
Material	TPE (moulded)
Degree of electrical protection	IP67
Mounting system	Pipe fixing

Communication interface	
Protocol	Modbus-RTU
Standard	EIA-RS 485 half duplex
Baud rate	19.200 baud/s

Environmental conditions	
Room temperature	-10°C…50°C, UR max. 85% - no condensation
Storage and transport	-40°C…80°C, UR max 85% - no condensation

Certifications	
EC Low Voltage Directive	2014/35/UE: 26/04/2014
Electromagnetic Compatibility Directive	2014/30/UE
EC Machinery Directive	2006/42/EC

RETURN TEMPERATURE CONTROL

eRTCV control valve receives two return temperature set-points

- Tset_heating: heating operation mode
- Tset_raffrescamento: cooling operation mode

via

- on-board control panel
- 0-10V analogue command from an external controller
- Modbus

The control system distinguishes between heating or cooling mode of operation via the 'summer/winter' digital input (to be connected to a device with clean contacts)

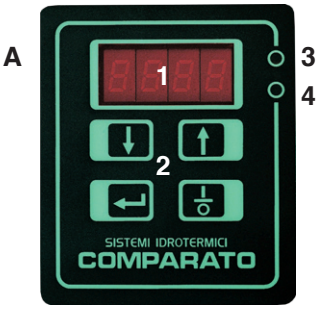
The set return temperature value is reached and kept constant by adjusting the valve opening.

SHUT-OFF

eRTCV receives an I/0 activation command from a device equipped with clean contacts: when the system is deactivated, the control valve is instructed to fully close, thus fulfilling the shut-off function of the controlled system.

CONTROL PANEL

Using the device's on-board control panel, the operating status can be displayed, and all setting and commissioning operations can be carried out easily and immediately.



1 : Display
2 : Keyboard
3 : Red LED - activation
4 : Green LED - deactivation

Display blocked

To restrict access to the controller's control parameters, the display can be locked: unlocking is only possible by entering the correct password.

ANALOGUE CONTROL

With a 0-10V dc signal, the set-point value of the return temperature can be adjusted in both heating and cooling mode.

MODBUS

By connecting to the RS 485 serial port with the Modbus-RTU protocol, it is possible to access all the regulation parameters provided by the operating logs, supervise the status of the valve and send commands to the valve.

The Modbus address table can be downloaded from www.comparato.com

DATALOGGER

The device stores the activation time. Each day, when 24:00 hours are reached, the following information package is stored:

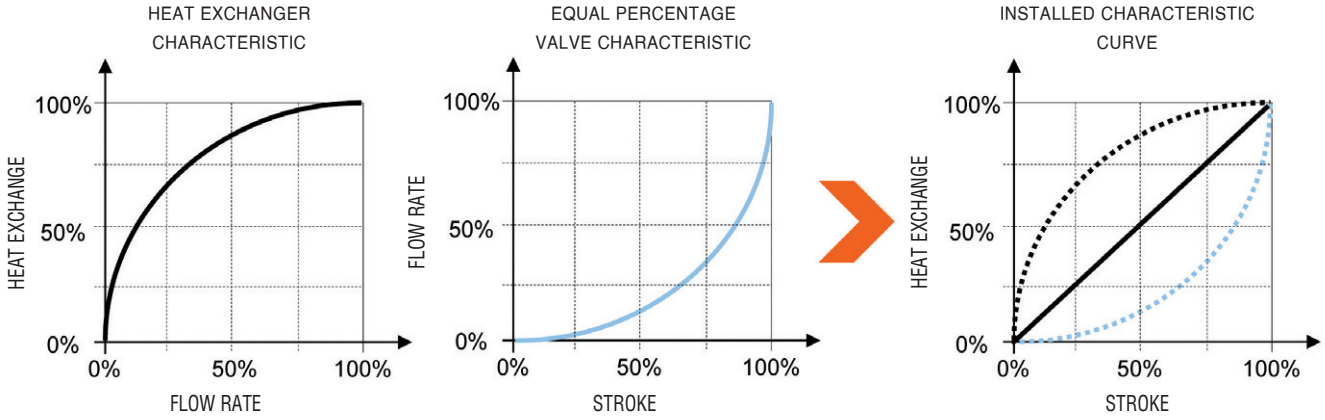
• Date (day/month/year)

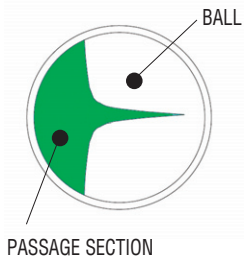
• Activation time (hours:minutes)

When the memory is used up, the information packets are overwritten starting with the oldest. Data remain in stored even with no power supply, thanks to the buffer battery, and are transmitted via Modbus-RTU when requested by the network master.

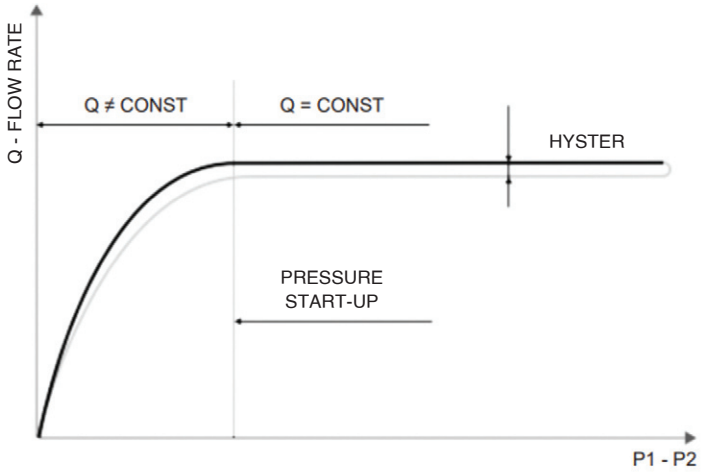
CONTROL FEATURE

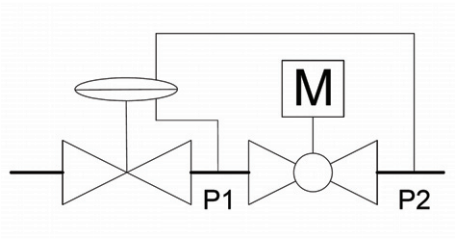
The control valve is equipped with an equal percentage characteristic curve, obtained by means of special modulation discs, which makes it possible to compensate for the non-linearity of heat exchange and to obtain a constant-gain system.





START-UP CURVES





The graph above shows an example of a characteristic curve of the control and balancing valve, in which the start-up pressure and hysteresis can be seen.

The use of a differential pressure gauge to measure the pressure drop obtained through the valve allows to check whether the operating point is in the correct operating range (and thus whether the flow rate is kept constant) by simply ensuring that the measured value P1 - P2 is greater than the start-up value.

If the measured ΔP value is lower than the start-up value, the valve functions as a fixed orifice valve.

DIMENSIONING

The choice of calibration implies a different set of parameters for the PID controller in order to optimise regulation according to the group of utilities for which the device will be applied.

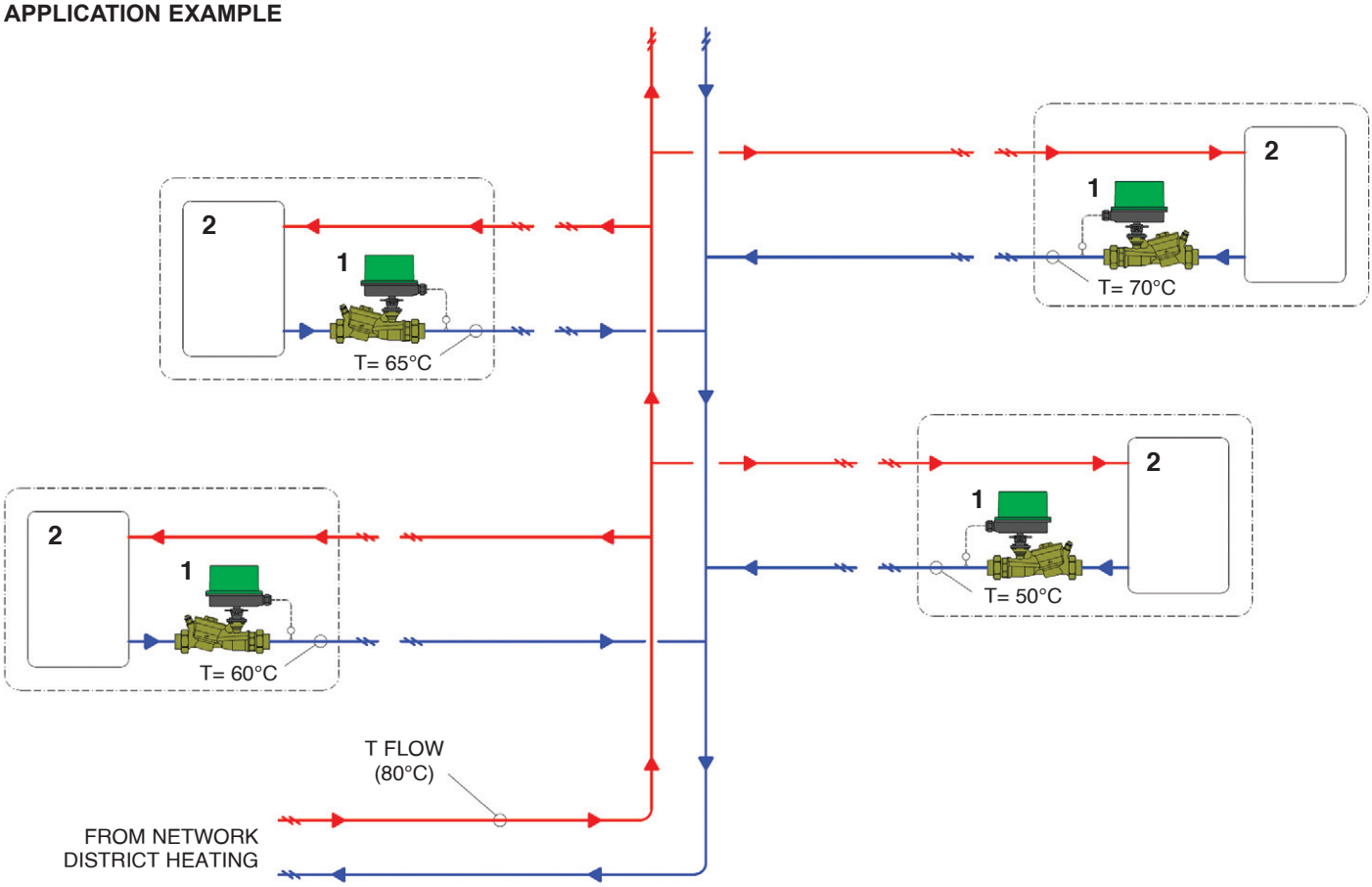
A • radiator-type systems operating with high temperature differentials

B • radiant type systems for heating and/or cooling (floor, wall, ceiling)

C • fancoil-type systems for heating and/or cooling involving heat exchange via mechanical ventilation

The valve diameter is selected on the basis of the flow rate and/or power output to be delivered to the utility that the **eRTCV** control needs to serve.

APPLICATION EXAMPLE



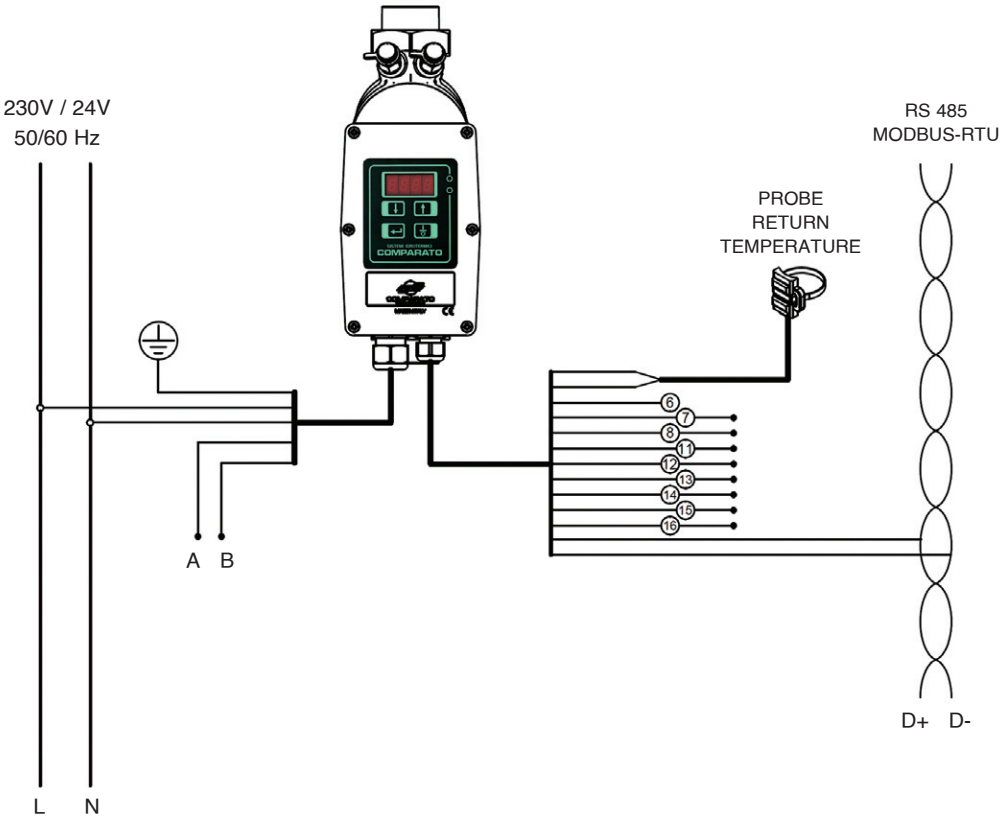
1 : **eRTCV** electronic return temperature control valve (setting for radiators)

2 : Utility

eRTCV

Modbus

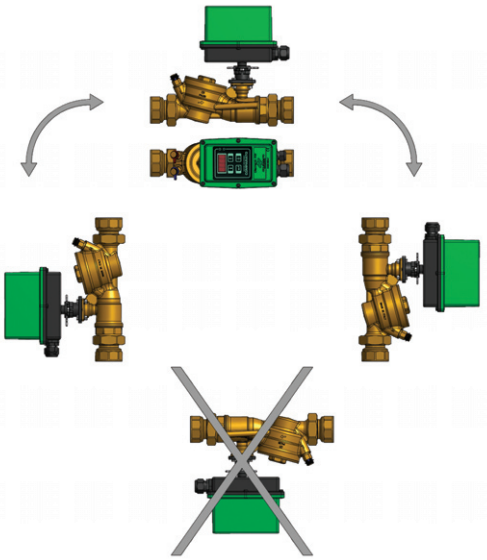
ELECTRICAL CONNECTIONS



N°	Type	Description
A	Relay output	Activation signal
B	Relay output	Activation signal
6	Digital input	Activation command
7	Digital input	Summer / winter selector
8	GND	Common for digital input
11	Analogue input	0-10V (+)
12	Analogue input	0-10V (-)
13	Aux limit switch	Open valve signal
14	Aux limit switch	Open valve signal
15	Aux limit switch	Closed valve signal
16	Aux limit switch	Closed valve signal

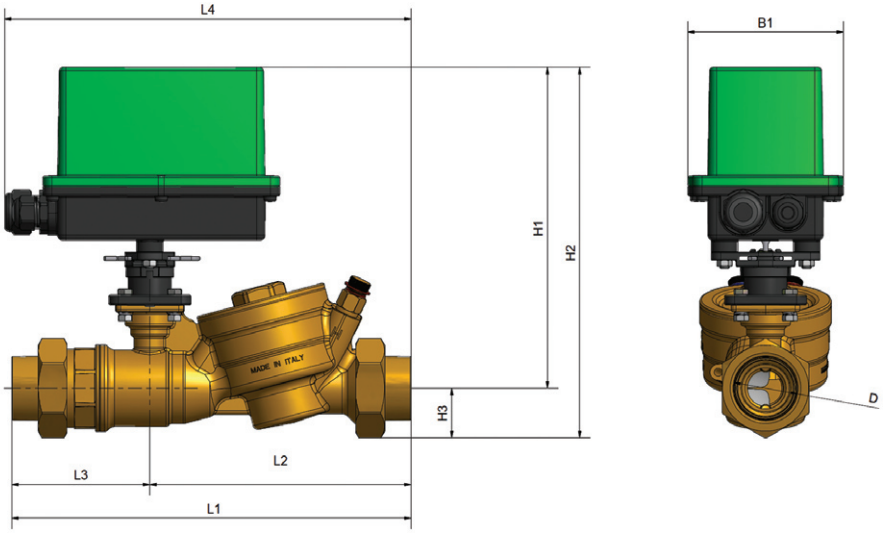
Electrical connections must be made inside a suitable derivation box (not included).

INSTALLATION

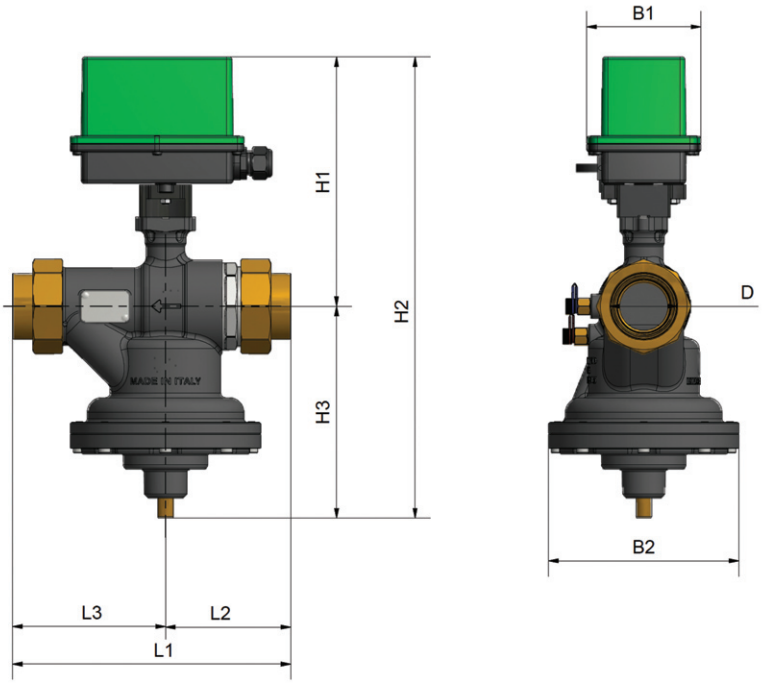


The device can be installed on both the flow line and the return line.

OVERALL SIZE



Type	DN (mm)	D	L1	L2	L3	L4	H1	H2	H3	B1
ERTCV2_15	15	1/2"	143	102	42	197	188	208	20	95
ERTCV2_20	20	3/4"	143	102	42	197	188	208	20	95
ERTCV2_25 (A - B)	25	1"	243	159	84	248	195	226	30	95
ERTCV2_25 (C - D)	25	1"1/4	269	172	97	261	195	226	30	95



Type	DN (mm)	D	L1	L2	L3	H1	H2	H3	B1	B2
ERTCV2_40	40	1"1/2	231	104	127	207	383	176	95	158
ERTCV2_50	50	2"	270	124	146	215	436	221	95	200

ACCESSORIES

Shell insulation

Material: cross-linked closed-cell polyethylene insulation

CODE	CONNECTION
INSULATION	
CBCV15R	1/2"
CBCV20R	3/4"
CBCV25R	1"
CBCV32R	1"1/4
CBCV40R	1"1/2
CBCV50R	2"

EXAMPLE OF SPECIFICATIONS

ERTCV ELECTRONIC RETURN TEMPERATURE CONTROL VALVE, regulating and balancing PICV valve with shut-off function, contact temperature probe, integrated monitoring and control interface, RS485 serial with Modbus- RTU protocol, DN40, PN16, max. flow rate 6.0 mc/h, regulator calibration for radiator systems, power supply 230V 50/60Hz.

Brand: **COMPARATO**

Model: **eRTCV**

Code: **ERTCV2240AA**

UPDATED DATA SHEETS AVAILABLE AT www.comparato.com